

SatFACTS EXTENDED

Volume 15 - #172

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PAS-2/IS-2 Replacement?

SFE for November reported the original PanAmSat #2 satellite at 169E is scheduled to go into 'inclined orbit' as you read these words - or just prior. Our report further indicating that over the coming 12 month period the deviation from geostationary flight would gradually increase making use of the satellite limited to something under 24 hours per day, or, requiring a tracking dish to follow the 'figure-8' motion.

Subsequently there has been an announcement from user Australia Network advising users:

"From mid-January 2009 Australia Network will cease transmission on the IS2 (PAS-2) satellite and switch to the newly relocated IS5 satellite. This change will effect reception for our rebroadcast partners and viewers who currently access our Pacific service using direct-to-home satellite equipment. This change to our satellite transmission is due to IS2 reaching the end of its serviceable life."

An interpretation of this statement would suggest the use of PAS-2/IS2 in an inclined orbit mode would therefore last only from mid-December to mid-January and as the deviation caused by inclined orbit will be small, only "large dish sizes (greater than 7 metres) will be affected" before IS5 arrives. That all seems to be good news but the devil is in the detail.

Satellite owners/operators have for many decades been less than forthright when it comes to giving out information concerning satellite problems. If there were an international ranking by 'level of truthfulness' for various categories of businesses, satellite operators might be in a tie with used-car salesmen. Their conviction from early days has been "anything that deals with the 'health' of a satellite is commercially sensitive." When pressed on the issue, the explanation given typically begins with "satellite service is very competitive and we would not want our competitors to know of a problem." The fallacy with that is the satellite design, construction and launch world is a very small 'family' and engineers and technicians do talk. So what really happens is it is the

IS5? Thanks for the GIFT!

Intelsat's IS5 began life as PAS-5 on August 28, 1997; a Hughes/Boeing HS601HP. Within a year on-ground controllers detected significant degradation of the nickel-hydrogen battery requiring the satellite be put to sleep (out of operation) during twice-annual periods of solar eclipse (this causes the sun to be blocked at the satellite by the earth and for up to 12 hours there is no solar charging current). Naturally full-time users were not pleased to have their transponders shut down for lengthy periods over several days twice each year. PanAmSat went to their insurers claiming the satellite "a total loss" and according to news reports at the time they received US\$185 million in compensation. Seemingly that would be the end of this story; *not yet*. In May 2002 PAS-5 was leased to Arabsat where it was renamed Arabsat 2C; bad batteries and all. Subsequently the satellite at 26E would be renamed (again) Badr C. Intelsat data tells us nothing, *zero*, about this satellite's current use or health - only that information about it is "Customer Proprietary" - that "commercial sensitivity" cop-out again. SO - is it really IS5 that is coming to our rescue January 15th? Are we blessed or what? *Gotta love Intelsat.*

would-be satellite customer who is left in the dark, often ending up signing onto a satellite which has operational problems never disclosed. PAS-8's after-launch mechanical problems while unfurling the solar array is one example of that; D1's mis-connected polarity determining antenna feedlines is another. There have been tens of additional 'commercially sensitive' faults.

Which brings us to IS-5, which Australia Network tells us, "...will replace IS2 in the same orbit position and it will not be necessary for viewers to re-point their satellite dishes. Viewers accessing our Pacific service will be required to retune satellite reception equipment."

So we can all rest easy now; right? Note quite (above).

In this issue: PAS-2/IS5 Replacement; D3 "Facts"

Bob Cooper's SatFACTS Extended - December 2008 - page 1

The D3 Enigma

SFE #171 reported a number of unconfirmed rumours involving the projected launch and turn-on of Optus D3. An inadvertent (meaning *our* carelessness) error crept into the discussion of LNBF local oscillator frequencies already in the field in Australia which we now correct.

Present Austar, Foxtel LNBF's have a single LO (local oscillator) frequency; 10.700. There *are* non-Foxtel/ Austar versions equipped with twin LOs (11.300 and 10.700 for example) but the *official* device has only the 10.700 on board. That means (as we explore below):

C1 = 12.25-12.75 minus 10.700 = 1550-2050 L-band

D3 = 11.7-12.2 minus 10.700 = 1000-1500 L-band

Now, our report did create feedback from a number of 'informed sources' and at least one highly placed individual makes the following point(s):

"1/ C1 is fully committed to Australian customers in the 12.25-12.75 GHz band. Switching capability *does* exist to include NZ (although at a lower EIRP from power splitting).

"2/ C1 also provides some service to the Department of Defense in Australia (X, Ka, L bands).

"3/ D3 has been 'on build' for some time now and the design is stable.

"4/ D3 has 8 x 44 watt transponders with 54 MHz bandwidth in the 12.25-12.75 band designed for NZ coverage (reportedly all pre-leased to Sky; *unconfirmed*).

"5/ And, 24 x 125 watt transponders in the 11.7-12.2 band; these are 36 MHz wide. There is an in-built switching capability to use the NZ beam (with 11.7-12.2) but basically the intended operation is dual polarity coverage of *Australia*. The 11.7-12.2 band is established by the ITU broadcasting satellite plan (see below).

"When D3 and C1 are co-located the sum is a 11.7-12.75 capability to Australia (less a tiny 12.2-12.25 50 MHz) and if switched, to NZ as well.

"Sky (NZ) of course began changing out or switching to a new dual boresight, switched polarity LNBF with the LO at 10.750 (note *not* the same as Australia's 10.700). This 10.750 LO gives Sky NZ access through a twin focal point feed system to 11.7-12.75 from the to-be-launched D3 on either polarity, as well as 12.25-12.75 from D1 (either polarity)."

Note 1: D1 = 12.25-12.75 minus 10.750 = 1500-2000 L-band

D3 = 11.7-12.75 minus 10.750 = 950-2000 L-band although the intended use is 12.25-12.75 only for New Zealand (1500-2000).

Note 2: With Sky (NZ) apparently planning to use 12.25-12.75 from D3 at 156E, some of the numbers do not fit. 8 x 54 MHz is 432 MHz (out of a full 500 MHz bandwidth; leaving 68 MHz 'someplace' between 12.25 and 12.75 not planned for NZ use).

Note 3: Sky NZ apparently uses C1 Foxtel itself for linking purposes on a handful of service channels. How

Present users of PAS-2 / 166E

3845V: Al Jazeera, ART Australia (CA)

3864V: Pacific IP (data)

3901H: 'California Bouquet' including Australia Net Pacific, BBC World News, Iqraa (FTA)

3992V: Fox (CA)

4022H: Hope Channel International (FTA)

...

12.281V: Telstra including ABC1 NT, WIN, BigPond Broadband (CA)

12.401V: Airang World (FTA)

12.604V: NASA TV (CA)

...

As you can see from the above, PanAmSat/ Intelsat has significantly scaled back use of this satellite in favour of PAS-8/Intelsat 8 (166E) and Intelsat 1701 (180E). The 'California Bouquet' on 3901V was perhaps the most important service from shortly after the late 1994 start of service and at various times included FTA movies, sport, general entertainment and news services as North American cable TV speculators attempted to recreate the US experience in the Pacific; alas, it was not to be.

The future is not bright

Intelsat 14: to 115E as replacement April-June 09

Intelsat 15: to 85.15E replacing IS-709 April-June 09

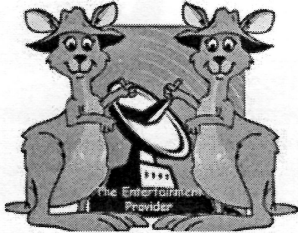
Intelsat 18: to 180E replacing IS-701 January-March 2011.

their own 12.25-12.75 is going to function simultaneously to taking feeds from C1 (which will of course be far weaker in level at Sky than the new D3 transponders) seems to be an unanswered question at this point. What the 54 MHz bandwidth transponders will do is allow as many as four HD service channels within a transponder for Sky clients however.

Which brings us to an area of conflict. Although the D3 satellite could with on-board switching provide service to NZ in the 11.7-12.2 'lower downlink band', in fact it would at the present time be *illegal* for them to do so. Why?

"6/ The ITU (International Telecommunications Union) plans for what satellite bands can go to which geographic areas shows there has been *no filing* (application) for D3 to cover NZ in the 11.7-12.2 GHz band. In fact, New Zealand has its own 'ITU Priority Plan' on file, from 158E (half way between C1/D3 and D1). This two degree spacing (156-158 or 158-160), based upon a scheme to allow launch of a New Zealand satellite to 158E, makes any future use of 11.7-12.2 from D3 difficult (ie. *not* practical)."

Numbers: *The devil is in the detail.*



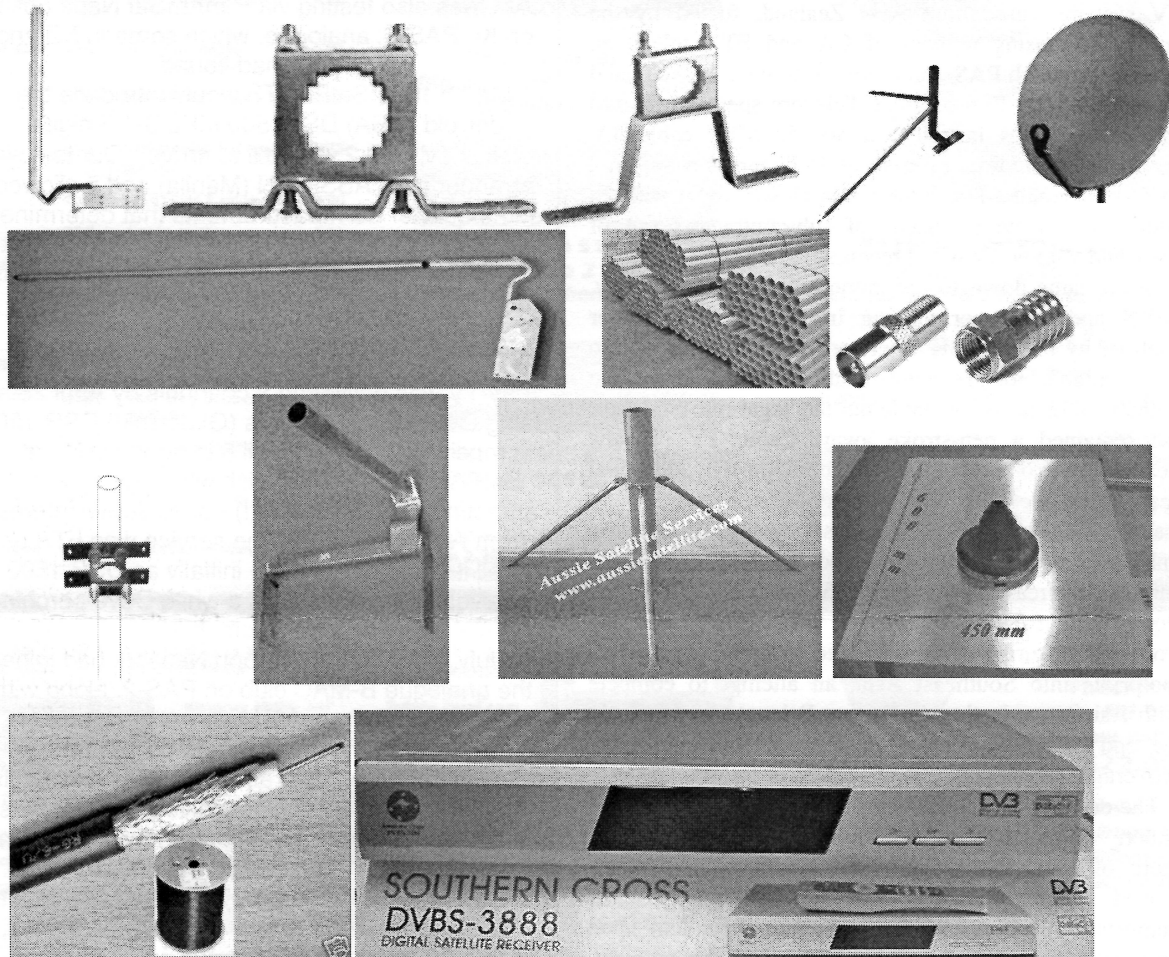
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Freeview NZ (Terrestrial) HD Box

'MyFreeview' using a Zinwell branded STB has been demonstrated although whether the 'prototype' box will be available in NZ stores prior to Christmas remains uncertain. The UHF tuner equipped box has a 250 GB hard drive capable of up to 80 hours of program recording. Good - HDMI, 1/2 + 1/4 speed playback (intended for looking closely at sporting event calls), twin tuners to record one while watching another. Not so good - no UHF modulator and no announced price. High Definition remains a UHF delivered option only with no plans to make it available for satellite viewers. Plans to expand the coverage of UHF (Whangarei, New Plymouth for example) have reportedly been shelved by a government not wishing to invest any additional money into the scheme given the current economic state.

Another new product, apparently available prior to Christmas, is a Hyundai brand 'Combo Satellite/Terrestrial HD Personal Video Recorder (model AH-3110)'. Well, not quite. The unit allows reception (from either satellite or UHF) to be fed via a USB connector to "an external HDD recorder". What perhaps makes the 3110 unique is the satellite + UHF capability (two tuners, one for each service but each requiring a suitable antenna system). A 7-day EPG guide, from the satellite service, is also claimed to be useful for the UHF received channels - overlooking that some UHF channels (Chinese TV 8, TV Central) are not transmitted on satellite. Price? NZ\$579. Nice but hardly the ultimate machine.

Turning Hardware into Antiques

A mathematical derivation known to physicists as 'The Shannon Limit' is on the way. Adaptive Coding and Modulation (ACM) is a technology which has been improving annually; it means the ability to stack a dozen-plus TV channels into a fixed bandwidth (such as 36 MHz on satellite) without creating artefacts which lead to viewer dissatisfaction. Any bandwidth has a maximum number of dissimilar programme channels that can be compressed into (onto) a single (satellite) transponder or (terrestrial) bandwidth. This is known as 'The Shannon Limit' which, akin to the 'speed of light', can be approached but never exceeded (except of course in movies and TV serials such as Battlestar Gallatica).

With a newly created and highly complex software routine known as DVB-S2, that limit is in sight. Which means? That while the past decade has been spent chasing the Holy Grail of compression ("more, more, more in one fixed bandwidth slot!"), the end is in sight; DVB-S2 is believed to be that end.

What it does is create so many unique addresses (an address is essential to creating digital communications) that as the creators claim, "every grain of sand on earth, every human being, all of their pets and all of their electronic devices can now have a unique address."How

far away is technology from 'assigning' a 'unique address' to each newly born child to stay with that person for life?" The technology using DVB-S2 and related IPv6 (Internet protocol Version Six) is apparently now ready for the task.

But not much further (why we need to give an address to each grain of sand on earth probably allows plenty of room for the new-borns); The Shannon Limit is now within grasp and its natural limits on signal-to-noise ratio identifiable. One side effect - DVB-S2 claims it will allow HDTV using the standard MPEG-2 format bandwidths; there may be hope for Freeview NZ satellite yet. Of course all of those existing boxes will need to be replaced and attempts even by Sky NZ to using MPEG-4 for HDTV will have to be rethought. Ain't science a buzz?

How not to run a business

In Thailand authorities estimate 1.33 million homes have non-paying reception of cable TV and/or satellite reception. Conversely, the number of actual paying homes is reported to be 509,000. Didn't Mad Max visit Thailand, once???

Charlie gets his legal bill paid

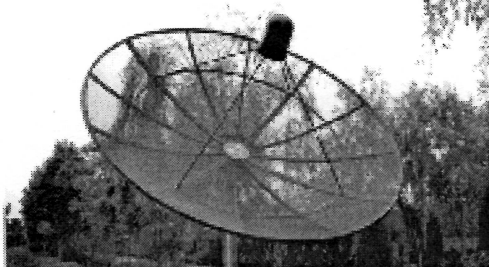
SFE#166 reported how in a California courtroom Echostar's claim that NDS had 'hacked' their smart cards and distributed the technology via Internet was turned into a 'win-win'; each side could claim victory. What Echostar could not claim was collecting money from NDS - beyond a paltry \$1,500 US. SFE had estimated NDS with 25+ attorneys in attendance throughout the trial may have spent as much as US\$100 million on their defense while Echostar's Charlie Ergen., known for his frugality, allegedly spent US\$20 million. Not so. A US court has approved the payment of US\$8.3 million to Echostar to cover "legal fees and costs" in their side of the suit. The judge had ruled both sides were 'correct' but declined to rule in favour of an Echostar claim they were owed over \$1 billion US for NDS's infringement of its smart card system. The 8.3 million dollar court costs are a form of penalty against NDS.

Imparja reconsiders

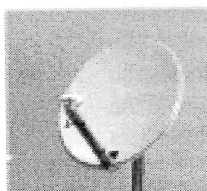
The Alice Springs television broadcaster, carried through the Aurora program, has made yet another abrupt turn in its policies concerning who it will approve for Irdeto-1/2 smart card service. Imparja has been on all sides of this issue from the day Aurora launched, at one time actually promoting its service in Tasmania through local agents. The channel has more recently denied access to its service quoting the 'high cost of approving individual service requests'. The ACMA (Australian Media and Communications Authority) intervened and now we have yet one more variation in the approval process. There are two possible classes of approval under the new policies; 'Travellers' who are in

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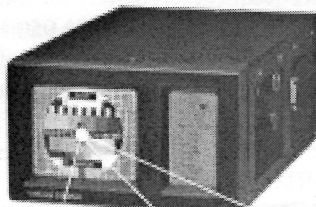
Caravan Digital Ant	\$80	PBT C+Ku band LNB	\$65
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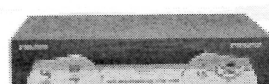
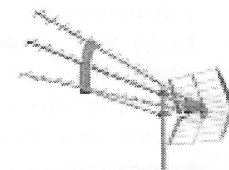
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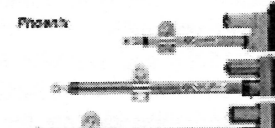
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\$45 each how low is this



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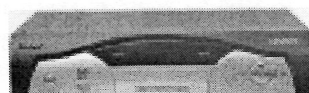
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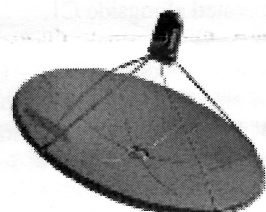


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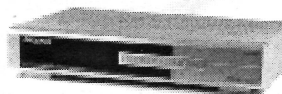


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mobile homes or campers and within the Imparja service area for a specified period of time at a per-application cost of A\$55 (GST inclusive), and, 'Blackspot' permanent viewers (A\$33 inclusive of GST) - subject to ACMA 'approval' (verification) of the applicant's inability to receive over the air terrestrial television which might conflict with the Imparja service.

Of interest. A 1.8m dish in (USA) Hawaii with an authorized Aurora (Imparja) smart card works on the 'NA Hawaiian beam' of C1. How do we know? The Channel 9 'Today' show actually receives Emails from viewers there!

HDTV Hype in Australia

Ten Network plans an April 1 start of a 24/7 HD (and SD) television sports channel (HD on channel 1, SD on channel 12). It will be known as 'One HD' and will feature international and local sport. As it happens, the bulk of TVs now being sold in Australia have inbuilt HDTV tuners whereas most STBs (including those with PVR capability) are SD only. So STB viewers will be forced to consider replacing their one-two-three year old STB with a newer version that allows HD TV reception. Early programme listings suggest the USA is a major source of sporting events for the 'HD1' service.

The Australian HDTV world continues to be perplexing. As of 1 January the existing networks (7, 9, 10) will be allowed to multicast an additional SD channel (HD multicasting has been permissible). To energize the transition from analogue to digital, government is actively considering a 'free STB' plan at this time.

NDS control sold

NDS, originally a part of the Murdoch empire, has become 'private'. Permira Newcos will own 51% of the Israeli based encryption firm (News Corp will own 49%).

Piracy TV Show

The executive producer of the TV show 'Heroes'/'Lost' partnering with author Matt Mason is planning a 13 part TV show featuring 'piracy' in the video and computer industries. There will be some familiar names in the 13 week series including Mad Max (you heard it here first) and this author. The theme is *'piracy' has forced technology to evolve faster in response to individual creativity which is outside the normal corporate world.*

End of 'another' era

Before there could be 'hacking' of pay-TV services, first there had to be encryption systems. One of the oldest original such systems is shutting down December 31st after a formal debut on January 15, 1986; 15 days shy of 22 years. Videocipher is the name and from its built-in design flaws piracy of encrypted television would blossom.

In 1983 California firm Linkabit announced the creation of a system intended to secure satellite transmissions; they called it VC1. There were two levels of concern in that era - cable TV programming which

was being transmitted FTA via a growing number of North American domestic satellites, and, major network services including 'backhaul' of sporting events (from a distant stadium back to network headquarters where the event was turned into a commercial product). VC1 was a complex system requiring descrambler devices physically larger than many television receivers and while the video was well secured the audio was allowed to run 'open'. HBO (Home Box Office), the primary provider of premium programming to cable, led an attempt to create a system which would allow scrambling of cable service programming at a cost of under the \$15,000 per VC1 descrambler cost. Major networks, in Canada and the United States, could deal with such overhead but cable systems could not; the networks were encoding a single channel but cable headends would require tens of descramblers at each location. The target price for a scaled-down VC1 was established at \$1,500.

During this developmental period (1983 - 1985) a separate phenomenon had become an additional factor in the mix; C-band home satellite dishes of which more than two million existed by mid-1985. Their growth was approaching 75,000 new systems per month and having a BUD (Big Ugly Dish) in your yard or on your roof was the latest American 'gotta-have' consumer item, even at prices exceeding \$2,000 each.

BUDs were a mixed bag. When they were largely limited to rural families, beyond the reach of a local cable line, BUD owners were considered a possible new market for encrypted programming - although the sale of the systems was built upon a house of cards because owning a BUD was to have access to 'cable TV programming - FREE'. In other words, because the services were FTA and a BUD would provide access, nobody could be certain these same buyers and more in the future would opt for a BUD if they actually had to pay for the programming.

Still, HBO believed it saw a market there - a way to pick up perhaps a couple of million new paying viewers, if only the encryption - decryption costs could be brought down to say \$500 per home receiver.

VC1 was expensive because it was complex. HBO, as the leading pay-cable programmer and the energy behind the 'make it cheaper' movement within the cable industry, put up the dollars to make this happen; it was, after all, one of those projects where research dollars invested would produce results; cheaper-better encryption was but a milestone sway.

As BUDs exploded across the countryside, delivering 'cable pay without paying' the pressure on 'make it cheaper' also exploded; "make it cheaper sure - but FAST!" because now tens of thousands of cable subscribers were disconnecting in favour of a BUD. "Why pay? It is free with a BUD!"

Cheaper and faster gave way to faster and here the seed of failure would be sown. VCII was the result; under \$500 (US\$395 initially), available as a stand alone box to plug into existing BUD receivers, or built-in to new VCII combo receiver + decoder units. Cable and high tech firm MA/COM (previously Microwave Associates) acquired the original creator firm Linkabit and on January 15, 1986 HBO went scrambled. Over the following two years, dozens of cable service channels joined the move to encryption.

"Faster" was the flaw; VCII went into the field with several weaknesses and by August 1986 those mistakes had been discovered by what would shortly grow into an army of 'hackers'. It would be a hacker's game until 1991 when VCII+ (RS) appeared as a replacement. By 1993, all VCII users would convert to II+ and it is this system, now approaching 16 years of largely successful operation, which will cease on December 31. Of interest, CNN, TBS, TNT, Headline News plus The Weather Channel are the only current users of the aged system - the final remaining analogue-encrypted cable service channels in North America. 'RIP' Videocipher - a worthy development now a footnote in history.

Bird Updates

AsiaSat 3S/105E: "Three new FTAs on 4129H; Sr 13.600, 3/4." (Editor's note: Chances these are still FTA slim.)

Optus C1/156E: T14/12.438H (27.800, 3/4) has changed EPG listing for what was '11' to HITS' (V1071, A1072 with teletext 1076). EPG shows it has shows such as 'Friends', 'Will and Grace' (et al) and data rate indicates it is SD. On T17/12.558H (27.800, 3/4), a mixed day including such oldies as 'Teletubbies' in daytime and 'David Letterman' at night (channel EPG title is 'CBeebies'). On T4/12.447V, Optus has been testing (27.800, 3/4) 5 new TV channels; 'DAL M, 1 etc. through 4'. Not actually 5 channels here - screen is split into four pictures (VPID 1612, 1622, 1632 and 1642) while the remaining four channels have one each with matching audio. This has been a test of something - who knows what! Aurora T3/12.407 30.000, 3/4 (yes - NZ as well) A517 has '2RPH' which 'Radio for the print handicapped', FTA. A similar service dating back to start of Aurora using A55 has been CA from launch - Aurora card never has worked here. Another new Aurora radio service - T6/12.527V, 30.000, 3/4 A1062 is Torres Strait Islanders Media Association ('TSIMA'); FTA at present.

Optus D2/152E: SCPC feeds of late; Globecast 12.680V, 6.670, 3/4 FTA NRL Grand Final; 'Rove' fed on 12.660V, 6.670, 3/4 (FTA/SD). TVN feed from Geraldton (WA) 12.445H, 6.670, 3/4; 12.660V and 12.675V (14.070, 3/4) being fed simultaneously. 12.270V, 6.670, 3/4 Astralinks feed to TV3 NZ. MCPC: Globecast 12.545V, 22.500, 3/4 channel formerly CCTV9 label now 'NAB TV' (V6102, A6202) - CA with

constant video data rate of 4 MBit/s plus 'nba_hot' and 'nba_Thai' on same transponder. 'TM A Celebrity' from northern NSW (NTL CA) ran 12.680V, 6.670, 3/4 ('IAC8 Path 2'); backhaul feed was 12.545V, 22.500, 3/4 V6107, A6207 + 6307 ('IAC') Irdeto V2 CA. 'KTV Tamil has departed 12.733V; on same transponder 'Salaam TV' originating in California began; now moved to 12.545V (22.500, 3/4). 'VTV-4' (Vietnam) also new on 12.545V, 22.500, 3/4. (Editor's note: CA by early December).

"UBI Coptic 'CTV' on 12.421H, 22.500, 3/4 returned to FTA and (UBI) has added Greek radio channels. New Italian (Catholic) channel (Tele Padre Pio) on 12.707H, 22.500, 3/4 (label says 'PPIO'). On 12.671H, 22.500, 3/4 'HEYA' replaces 'NSPT'; also 'TLBN' has replaced 'TLHY'. (IF, Qld)

Soapbox: "Reference SFE #171 discussion of LNB LOs. Perhaps if NZ used twin LOs of 10.750 and 11.300, this would allow 'stacking' of the D3 and D1 services between 950 and 2000 for 'seamless switching' between birds when viewers are changing programming channels?" (IF, Qld) "\$99.95 at Leading Edge Electronics buys a standard definition STB that is ready to record to both USB flashdrives and SD cards - SD cards would be capable of functioning in same manner as videotape. What appears to be an identical device from Sam's Warehouse at \$49.99 ('Cobalt' is apparent brand name). And it gets better. At 'Go-Lo' the same device for (A of course) \$29.99. The price of going digital in Australia goes lower and lower. - for \$79.95 a Arista 'High Def' digital STB (DVB-HD720)." (AI, NSW) "One home in five in Australia has 'pirated' TV programming and movies through Internet connections - says a study. The demand for USA same-day-release shows is a prime driver." (NS, Vic.) "Australian government has rejected Telstra bid-application to create 'National Broadband Network'; five additional bidders remain to be sorted." (IF, Qld.) "Digital radio in Australia? Check www.digitalradipoplus.com.au to determine if it is available in your area. The official launch date is May 2009 but Sydney (and other areas soon) already have it functioning. Like the UK, the service is in high band VHF and uses 'DAB+' technology. Receivers are expected to be on retailer shelves by late December." (AI, NSW) "Lots of strange stuff going on with DISH charges against Pansat/Freetech/Coolsat. Courts apparently do not talk and the decision to not force dealers to turn over details of buyers of FTA receivers capable of being field-modified for DISH reception has been ignored (SFE#170; page 1). It all appears to be down to court requirements as some documents were apparently not filed in the proper format. In the meantime, DISH's latest version encryption is creating major problems for pirates so perhaps DISH wins this one afterall." (GC, USA)

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